Initial results of the GW-LCYCLE campaign 2015/16 – results on the life cycle of gravity waves from combined airborne and ground based observations

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From December 2015 to March 2016 a coordinated field campaign was conducted in Northern Scandinavia to study the life cycle of gravity waves from their source to their dissipation in the mesosphere. Airborne observations with the German G5 research aircraft HALO and the DLR-Falcon were combined with ground based lidar and radar observations from ALOMAR, Norway, ESRANGE, Sweden, and Sodankylä, Finland. From all these stations, coordinated radiosonde launches were conducted during periods of enhanced gravity wave activity as predicted by the

ECMWF integrated forecast system. Besides yielding flight level measurements of temperatures, winds and pressure from which energy and momentum fluxes are derived, the airborne platforms were equipped with the imaging FTIR-spectrometer GLORIA, two lidars to measure tropospheric winds and stratospheric aerosols and PSC-particles, in-situ instruments to probe various trace gases, as well as an airglow imager detecting spatial structures in the hydroxyl airglow originating from about 87 km altitude. During a total of 31 flight hours with HALO and 35 flight hours with the DLR-Falcon, we managed to observe gravity waves from various sources such as from flow over orography, from the jet stream and fronts, as well as from shallow convection during a polar low event.

This paper will give an overview of the campaign objectives and observations and will focus on a few selected case studies to highlight the quality and potential of the obtained data set.

Key words: Gravity waves, Sources, Dissipation, vertical coupling, airborne observations